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TECHNICAL PROGRESS AND SCIENCE IN THE USSR

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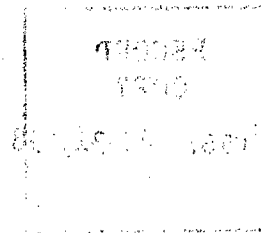
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FOREWORD

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TECHNICAL PROGRESS AND SCIENCE IN THE USSR

[Following is a translation of an unsigned article in the Russian periodical Priroda (Nature), Vol. 48, No. 8, August 1959, Moscow, pages 3-10.]

The June (1959) Plenum of the CC [Central Committee] of the CPSU [Communist Party of the Soviet Union] will go down in the history of our country as the most important stage in the realization of the resolution of the 21st Congress of the CPSU regarding the further development of industry and its technical progress. The Plenum thoroughly discussed and worked out a large-scale program for speeding up technical progress in all branches of the national economy, including measures for complex mechanization, for the automatization of production, for the introduction of production lines, and for the replacement of antiquated equipment, punches, and tools, with a view to the further expansion of industrial production and construction, to raising the quality of the products turned out, and to lowering the cost of these products and also the cost of construction. The Plenum unanimously directed an appeal to the workers, to the leaders, to the kolkhozniks to the Soviet intelligentsia, to all the toilers of the Soviet Union.

The acts of the June Plenum of the CC CPSU, permeated by a deep faith in the great strength of the people and by concern for the further strengthening and well-being of our socialist homeland, have been greeted by universal and hearty approval and have stimulated new enthusiasm for creative activity in the field of labor, in the mills and factories, in the pits and mines, in the oil industry and transportation, in institutes for scientific research, and in design bureaus and laboratories. The Soviet people are filled with determination to transform into reality the resolutions of the Communist Party, to not only execute them but also to surpass the grandiose seven-year plans and to accelerate greatly the movement forward toward our cherished goal--communism.

Technical progress in the national economy is a powerful means for building a Communist society. Uninterrupted progress in the techniques of production is one of the determining conditions for a still greater strengthening of the economic might of the Soviet state, for raising the living standards of the working class, and for the victory of socialism in peaceful competition with capitalism. Only on the basis of technical progress--the steadfast development of science and technology, the growth of the cultural and technical standards of the workers, the most perfect organization of production--is it possible to achieve an all-out increase in social production. And this, as the great Lenin indicated, is one of

the deep-rooted problems without the solution of which the final transition to Communism is impossible.

"The productivity of labor, "V. I. Lenin teaches, "is, in the final analysis, the most important, the most vital factor, for the victory of the new social order... Capitalism can and will be finally conquered, because socialism will create a new much higher productivity of labor...."

"As opposed to the capitalist system, Communism means higher labor productivity by voluntary, conscientious, united workers who make use of advanced techniques" (V. I. Lenin, Works, Volume 29, page 394).

In carrying out the will of its leader and teacher, the Communist Party, in all stages of socialist construction, has exerted enormous efforts toward ensuring the uninterrupted growth of the productive forces of the country and toward creating a powerful socialist industry -- the basis of progress in the national economy. The Soviet people headed by the Communist Party, which is steadfastly pursuing the general policy of Lenin, have striven for the transformation of the formerly backward Russia into a country with a first-class industry, a highly mechanized agriculture, and advanced science and technology.

A great step forward in the development and technical perfecting of all branches of the national economy was made during the years following the 20th Party Congress. As is indicated in the resolution of the Plenum of the CC CPSU, created and developed during this period in series production were more than 5,000 new perfected types of machines, mechanisms, apparatuses, and instruments, also, progressive technological processes in industry and construction were worked out and applied on a large scale; the level of the mechanization of heavy and labor-consuming work was significantly raised; the automatization of many production processes in industrial enterprises, in the construction industry, and in transportation was accomplished. Important work in mechanization and automatization was conducted in the mining industry; in metallurgy; in chemistry; in the extraction of coal and oil; electric power stations; mechanical engineering; the forestry industry, light industry, the food industry, and other branches; the construction industry, transportation; all of which has led to a further rise in production, in the productivity of labor. The heights attained by the Soviet Union in the peaceful use of atomic energy, jet aviation, the launching of the first earth satellite in the history of mankind, as well as the launching of the first cosmic rocket, have demonstrated to all the world the flourishing power of Soviet science and technology. "In all this," it is stated in the resolution of the Plenum, "much credit must go to our famous scientists, engineers, technicians, designers, and the multi-thousand army of workers and innovators of production."

Means for further technical progress in production were defined by the 21st Congress of the CPSU which approved a grandiose seven-year program for the expanded building of Communism in the USSR. Our seven-year plan, which has evoked the admiration of all progressive mankind and which has sowed fear and anxiety in the camp of the enemies of Communism,

is indeed majestic. We have entered a period of accelerated social development and of an unprecedented upward trend in economics and culture. Let us remember that the general output of industrial production has risen 80%, that electrical power has doubled, that the steel smelting reaches about 90 million tons per year, that the might of the chemical industry has trebled, that 15 million apartments will be built in cities and 7 million houses in rural areas, that the real income of the workers and peasants has risen 40%, and that we shall have the shortest work day and the shortest work week in the world. At the end of the seven-year plan the socialist countries will produce more than half of the world's industrial output: a fact which once and for all will insure the superiority of the world system of socialism over the world capitalist system in the sphere of material production. Armed scientifically with a well-devised seven-year plan for communist construction, we have entered into peaceful competition with the capitalist world.

Successful accomplishment of the seven-year plan for the development of the national economy of the USSR is inseparably linked with the perfecting of all branches of production. In the resolutions of the 21st Congress of the CPSU, a broad program for technical progress in the national economy was worked out providing for the abolition of hard labor as a result of complex mechanization of production processes, for the replacement and modernization of antiquated equipment, for the application of highly productive processes, for the quick development of the electrification of the country, for the automatization and further specialization of production, for the all-out utilization of the achievements and discoveries of science and technology. The Congress gave instructions concerning the further industrialization of construction work; concerning the completion, in the main, of the transition in railway and water transportation from steam engines of low economy to electrical, diesel, and gas-turbine engines, and the transition in air transportation to turbo-spiral and turbo-generator engines.

These extremely important measures, together with the plan worked out by the Party for the quick development of the chemical industry, have enormous significance as regards the further raising of all standards of production. We have all the necessary conditions for the accomplishment of this program. The main thing now, as was stated in the resolution of the Plenum, is to improve organizational work and Party and economic leadership by the application of advanced techniques commensurate with the new problems.

It is necessary for us to concentrate our attention on the elimination of those serious deficiencies which hinder the rate of technical progress. It is impossible to be reconciled with failure to carry out the prescribed tasks for working out and applying advanced techniques, for mastering the production of new types of products, for the modernization of new equipment. Such failure does serious damage to the interests of the national economy. Intolerable is the practice of delaying the working out and applying in production and construction of perfected technological processes, of economical types of buildings and structures, and

of effective materials. Erroneous is the position of some workers who, in working out and applying the new techniques, strive only to increase the output of production, overlooking the no less important aims -- increasing the productivity and lightening the work load of the workers, raising the quality and lowering the cost of production. It is impossible to carry out measures for the application of new techniques, especially those of mechanization and automatization, without a preliminary analysis of their effectiveness. All that is new and progressive is often not reflected in the construction designs of new plants, factories, and mines; complex mechanization and automatization are not provided for; plans are formed with great excesses, plus other faults.

"These deficiencies, "as is stated in the resolution of the Plenum, "are to a considerable extent created by technical conservatism on the part of economists and engineers and other technical leaders, by force of habit regarding old methods of production and old work tools, by the unwillingness of many economic leaders to overcome the obstacles connected with the application of new techniques, and by the absence of a state-wide approach to the solution of questions concerning the technical perfecting of production."

All-out acceleration of the rate of technical progress makes greater demands of all workers engaged in this most important state cause. The Plenum of the CC CPSU has made it incumbent upon party, soviet and economic organizations to develop more broadly the work for further technical progress that will insure a new rise in all branches of the national economy. It is necessary to conduct a decisive struggle against manifestations of technical conservatism, an indifferent attitude toward state interests, and lack of discipline; to increase the responsibility of leaders of enterprises and construction jobs, and of scientific, planning, and designing organizations in working out and mastering new techniques; and to develop the initiative of laborers, engineers, technicians, and scientists in the task of making production technically perfect. Deficiencies in the organization of scientific-research and experimental work must be eliminated through the creation of highly productive technological processes, new machines, mechanisms, and instruments and through applying them in production; through the working out of economical types of buildings and structures so that work is planned and financed according to the new techniques. The Plenum ascertained that the tasks related to important work in the field of the working out of new techniques which are vital to the state must become an organic part of the national economic plan. In the working out and applying of new technological processes, machines, mechanisms, and constructions designs, it is necessary first of all to proceed from the fact that they satisfy the requirements of the most rational and economical utilization of social labor, of material and monetary means; that they insure an increase in output, a rise in the quality and a lowering of the cost of production, an increase in the productivity of labor, the facilitation and rendering sanitary of labor conditions, the acceleration of and the cost reduction of construction, and the shortening of the period for the repayment of capital investments in comparison with the best achieve-

ments of native and foreign science and technology. There must also be worked out a proposal for creating economic incentives in the technical perfecting of production.

The main trend in the work of the Soviet national economy, as the Plenum considers it, must be toward the technical perfecting of production, conducted with the aim of raising the labor productivity and lightening the work load of the workers, of the quick development of industrial production, of the improvement of its quality and the lowering of its cost, and of the cost reduction and acceleration of production.

The Plenum of the CC CPSU has given to the Party and to all the Soviet people an accurate and clear-cut plan for further technical progress, for the development of production, and for the better organization of it. The successful accomplishment of this plan demands that all our work, based on the revolutionary theory of Marxism-Leninism, should be closely linked with life, should be concrete and purposeful. "We must realize clearly," said N. S. Khrushchev in his speech to the Plenum, "that now that the state power is in the hands of the working class and the Party directs all the work of Communist construction, in order to strengthen this theory in the consciousness of the people and to strengthen our state we must in every possible way develop the production of materials... In order to achieve final victory, we must in every possible way develop our production, must bestow more material blessings upon the people who are building socialism and Communism."

In working out a comprehensive program for the acceleration of technical progress in all branches of the national economy, the Plenum of the CC CPSU naturally gave much attention to the further development of science.

The forward movement of any kind of production is accomplished under the immediate influence of science. Nothing is capable of changing the methods of production and its technical basis so quickly, and indeed in such a revolutionary way, as science. New and perfected machines, appliances, instruments, and whole fields in which the new techniques are used, originate as a result of the new discoveries made by science and of the establishment of new principles -- the relations between natural phenomena.

In the socialist system science and production are closely allied: between them there is no barrier of private ownership, no obstacle peculiar to capitalist society in the dissemination of those new scientific ideas which conflict with self-motivated interests in trusts, concerns, and monopolies. The socialist state, building all of its economy on the principles of planning, is deeply interested in the development of science. By creating in the country a powerful network of scientifico-research institutes and experimental laboratories, it works out the most important problems, setting before itself a single purpose -- to turn new scientific discoveries to the good solely of society, to the good of mankind. Thanks to a pre-occupation with science, created by the most favorable conditions for a comprehensive development of scientific research, the Soviet Union has achieved significant successes in nuclear physics, radio engineering,

electronics, computing techniques, in the physics of semiconductors, and in many other fields of science which play a decisive role in technical progress. Workers of research institutes, of higher educational institutions, and of designing bureaus and factory laboratories have created many new machines, instruments, technological processes, and materials the use of which in the national economy is exerting a tremendous effect.

As is emphasized in the resolution of the Plenum of the CC, the party considers the basic means of technical progress in the country to be the collective mechanization and automatization of production, which have not only economic but also enormous social significance. The creative thought of scientists must be directed toward the creation of a stable scientific foundation for a thorough application of these effective means of technical progress in all branches of the national economy.

As is generally known, many types of automatic equipment are being constructed by means of electronic instruments, semiconductors, and radioactive and other means. Electronic regulators, multipliers and amplifiers, semiconductor thermoresistors, photocells and relays, various tracking systems, and copying and measuring instruments -- all this store of resources is playing a prominent role in automation. Of great importance is the realization of automation in production and of radioactive isotopes. The laws of electronics, the physics of the atomic nucleus and solids, optics, electromagnetism, and the theory of oscillation and stability of movement -- such is the physical basis of automation.

Broad mechanization and automatization of the productive processes is based also on the use of achievements in the mathematical disciplines, which have developed greatly in our country during the last 20 years. Such are the theory of information, of algorism, of probability-statistical methods, and of mathematical logic.

The successes of native scientists in many of these fields are widely known. Our achievements in nuclear physics, which have made a great contribution to the use of atomic energy for peaceful purposes, have received general recognition. The great leap forward in mastering the cosmos, accomplished by the Soviet nation during recent years, could have been realized only as a result of the high standard which our science has achieved in the field of mathematics, mechanics, aerodynamics, physics and chemistry of combustion, electronics, radio engineering, and automation. In the USSR there was created a solid base for experimentation -- a far-flung network of research institutes and experimental laboratories. Cadres of outstanding scientists were educated in the work of demonstrating their creative potentialities.

However, as was noted in many statements at the Plenum of the CC CPSU, the standard of scientific research, directly linked with the mechanization and automatization of production, is still lagging behind at a time when the most vital needs are being considered -- those which play a prominent role in the quickest fulfillment of the great seven-year plan. Work using computing techniques in systems of automatic control is being conducted slowly, and the newest achievements in physics and chemistry for the creation of technical means of automation are being insufficiently utilized.

It is known that the effectiveness of automation depends first of all on the maintenance of high reliability in the operation of the mechanisms used. The development of the theory of the reliability and precision of machines, of automatic lines, and of automatized production is on the whole a vital scientific problem. Nevertheless, it is in just the solution of this problem that we still collaborate in lax fashion with our scientific-research institutes and our most prominent scientists. In the field of automation only particular problems are being solved at the present time; that is, the automatization of separate aggregates and operations. The attention of many researchers is concentrated on the automatization of the functions of production control. The automatic regulation and control of production processes does not as yet occupy a central position in scientific research and has not received wide application. In the meantime, only complex automation based on the use of progressive and trustworthy mechanisms and on the application of the newest scientific and technical discoveries can significantly effect a rise in the standard of production.

The basic reason for all these shortcomings is that many research institutes, and also higher educational institutions, have poor contacts with production; all their daily scientific activity is often conducted out of touch with the current problems of the national economy. Some research organizations do not have a clear-cut conception of the over-all scientific picture. They do not work out problems in broad perspective, and over a long period of time they do not yield valuable, practical results. Still existent here and there among the leaders of scientific-research institutes are stagnation, conservatism, inertia, and the reluctance to abandon the old, obsolete methods of the organization of scientific activity.

The Plenum especially emphasized the greatest shortcoming in the organization of scientific work -- the weak coordination of the activity of scientific-research institutes which are closely allied in the over-all picture. This situation leads to a lack of coordination in the solution of the most important problems; the scientific forces are alienated; resources are wasted; the standard of work is lowered; and the application of successful findings in production is hindered. Unsatisfactorily organized is mutual information concerning the plans and findings of scientific work between institutes working in related fields. This practice leads to parallelism and irrational expenditure of state resources. Work on the mechanization and automatization of productive processes, as is indicated in the resolution of the Plenum, is hindered also because of the inadequate production of instruments, electrotechnical equipment, and new technical devices, and because of the faulty development of scientific-research and project-designing work.

In our great Soviet country, which has through the seven-year plan developed construction work unprecedented in history, a concentration of all the creative forces prevails. And the science of a socialist country cannot lag behind in this great movement. It must rank first; it must be the most advanced in the world not only in quality and if

logical content but also in the role which it plays in the technical progress of the country.

To arm the national economy with the new findings of theoretical research, with new discoveries, and with conclusions and recommendations which will greatly accelerate technical progress in all branches of industry, agriculture, transportation, and communication -- such is the important duty of Soviet scientists.

In the resolutions of the Plenum of the CC CPSU, it is emphasized that the most important problem of the Academy of Sciences USSR, the academies of construction and architecture of the USSR, the academies of sciences of the Union Republics, the associated scientific-research institutes, the higher educational institutions, and all Soviet scientists is the further creative development of science and technology as an inseparable part of practical Communist construction. For this it is necessary that all our science exist for the interests of the country, for the interests of fulfilling the seven-year plan with a view to expanding its activity not by alienating production but by closely allying itself with the urgent needs of production. The drawing together of scientific-research, designing, and project organizations with industry, construction, transportation, and communication creates conditions for a quicker introduction into practical use of the findings of research, and accelerates the rate of reconstruction of technological and automation in all sectors of the national economy.

In the resolutions of the Plenum, the following new improvements, which must be put into especially wide use, are outlined:

In the ferrous metal industry -- a series of processes connected with the processing of ore materials: the furnace charge for smelting; the continuous coking of poorly-clinkering coal; the use of natural gas and oxygen in blast-furnace and steel furnace production; the smelting of various grades of steel; and the rolling of metal, pipes, and hardware. In nonferrous metallurgy -- electrolysis; electrothermy; electrofusion; the use of oxygen; the conversion of interrupted processes into continuous ones; the complex use of raw materials; and other processes. In the chemical industry -- manufacturing chemical products on the basis of the use of natural and oil gases and of gases from oil-processing factories; new methods for the production of construction materials and for the processing of plastics and synthetic resins.

Interest in the development of agriculture demands the scientific working out of the newest, most effective, and most economical methods for obtaining complex and highly complicated mineral fertilizers; all possible chemical means of safeguarding agricultural crops against diseases, pests, and parasites; and many preparations which will aid in accelerating the harvests, in the mechanization of harvesting, and in the application of advanced agrotechnics.

The Plenum has outlined important measures for improving technological progress in the production of construction materials, in paper and woodworking, and in the light and food industries.

In the field of the complex mechanization and automatization of production, the Plenum of the CC has planned a series of activities in connection with those processes which consume the greatest labor. In ferrous and nonferrous metallurgy such are the production of rolled metal for pipes and hardware, the gathering of ore and rocks in the passageways of mining excavations, and the packing of products; in the chemical industry -- dosage, intra-factory transportation, the packing and wrapping of products; in machine building -- the production of castings and forgings; the transportation of materials, provisions, and manufactured articles; assembly-line and control operations in large-series production; metal and dyeing work. A series of labor-consuming processes is indicated in the oil and gas industry; in railway and water transportation; in the light, food, and fish industries; in the production of construction materials; and in the polygraphic and cinematographic industry.

In agriculture we are faced with the all-around mechanization of the cultivation and harvesting of industrial cultures, potatoes, and vegetables; of the processing and drying of grain; of the selecting and transporting of straw; of the procuring, preparation, and distribution of feed; and of the water-supply and cattle-breeding of farms.

Directing its attention to these immediate and urgent needs, the Plenum of the CC expressed the hope that soviet scientists, the workers of designing institutes and design bureaus, and enterprises and construction collectives will insure in the present seven-year plan the creation and use of new and perfected methods of production in all branches of the national economy.

In the resolutions of the Plenum an efficient program is outlined for accomplishing technical progress in all branches of the national economy. The most immediate problems of economic, Party, Komsomol, and trade-union organizations in accomplishing these vitally important measures through a further rise in the technical standard of socialist production, are defined. In this activity, which indeed belongs to all the people, the role of scientists, designers, researchers, engineers, and technicians is especially great. Their creative thought must outdistance the development of many production processes. "You see, it is a fully established principle: technical and scientific thought," N. S. Khrushchev said before the Plenum of the CC, "will always outdistance our work in the construction of machines and instruments. But does it follow from this that we must hold on to the old? No, we must promote at once a vigorous development of science and technology and do everything possible in order to apply as quickly as possible new machines, new instruments, and new devices."

The Communist Party, always showing concern for the scientists and for the creation of conditions most conducive to their creative power, in the present stage of expanded communist construction is also putting into effect great measures for better organization of scientific activities in the USSR, striving to heighten the role of science in

In the capitalist countries, where all wealth and power belong to the capitalists, all rationalization and mechanization of production is conducted with a view to strengthening the exploitation of the workers and to squeezing out the maximum profits, which go into the pockets of the owners of businesses and monopolies. The capitalist automatization of production is a most brutal scourge inflicted on the working people.

In the socialist countries, the uninterrupted perfecting of production, its automatization and complex mechanization, serve the interests of the workers and are directed toward raising their standard of living and lightening their work. Socialist automatization of production is carried out in the name of and for the welfare of the working people.

This is precisely why in our country, as in all socialist countries, the people greet with enthusiasm the appeals of the Communist Party. They understand that in order to attain the great goal of building Communism they can and must work hard. And how many remarkable examples of national initiative, of creative power, of whole-hearted service in the interest of Soviet society give us new life! The movement of brigades and Communist shock workers; pledges to fulfill the seven-year plan ahead of time by better utilization of internal reserves; the voluntary transfer of workers from brigades and sections with higher pay to groups lagging behind, in order to raise the latter to an advanced level; hundreds of thousands of ideas and ingenious proposals; the development of all forms of socialist competition -- such is the might of the Soviet people who march forward toward Communism.

And marching shoulder to shoulder with the people is the glorious army of Soviet scientists and specialists of all branches of science, who yet more firmly strengthen the ties with production and practice.

We live in a remarkable time. "To live," says N. S. Khrushchev, "becomes more and more joyful not only from year to year, but during each day of the year. It is as if we break off blocks of granite and with them erect for the ages the majestic structure of our Communist society. "To be a hardworking citizen in this great epoch, to put forth all effort, all energy, all creative power for the fulfillment of the vast problems entailed in the large-scale construction of a Communist society -- such is the duty of every Soviet citizen.

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